Rotating module – horizontal axis DMHe 100
Max. load 2,000 N, electrically operated

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1 Description

Rotating modules are used in assembly and handling processes to transform electrical energy into a rotating movement.

When using the rotating module, component parts can be rotated rationally, quickly and safely and can be assembled ergonomically from all sides.

The strongly reduced worm gear allows high holding torques in standstill.

The double-bearing drive shaft compensates high axial and radial forces.

The rotating module is designed for a long service life. The electronically commutated DC motor is virtually wear-free.

2 Validity of the documentation

This document applies to the following products:

Rotating modules - horizontal axis of data sheet.

The following types or part numbers are concerned:

- 6505 0236 E

3 Target group of this document

- Specialists, fitters and set-up men of machines and installations with expert knowledge in electrical engineering.

Qualification of the personnel

Expert knowledge means that the personnel must

- be in the position to read and completely understand technical specifications such as circuit diagrams and product-specific drawing documents,
- have expert knowledge (electric, hydraulic, pneumatic knowledge, etc.) of function and design of the corresponding components.

An **expert** is somebody who has due to its professional education and experiences sufficient knowledge and is familiar with the relevant regulations so that he

- can judge the entrusted works,
- can recognize the possible dangers,
- can take the required measures to eliminate dangers,
- knows the acknowledged standards, rules and guidelines of the technology.
- has the required knowledge for repair and mounting.

4 Symbols and signal words

⚠ DANGER

Danger of life / heavy health damages

Stands for an imminent danger.

If it is not avoided, death or very severe injuries will result.

⚠ WARNING

Person damage

Stands for a possibly dangerous situation.

If it is not avoided, death or very severe injuries will result.

⚠ CAUTION

Easy injuries / property damage

Stands for a possibly dangerous situation.

If it is not avoided, minor injuries or material damages will result.

Hazardous to the environment

The symbol stands for important information for the proper handling with materials that are hazardous to the environment.
Ignoring these notes can lead to heavy damages to the environment.

Mandatory sign!

The symbol stands for important information, necessary protection equipment, etc.

Note

This symbol stands for tips for users or especially useful information. This is no signal word for a dangerous or harmful situation.

5 Safety instructions

5.1 Basic information

The operating instructions serve for information and avoidance of dangers when installing the products into the machine as well as information and references for transport, storage and maintenance.

Only in strict compliance with these operating instructions, accidents and property damages can be avoided as well as trouble-free operation of the products can be guaranteed.

Furthermore, the consideration of the operating instructions will result in:

- reduced down times and repair costs,
- increased service life of the products.

Note

These operating instructions are not a replacement for the operating instructions of the entire machine.

5.2 General safety tips

- Avoid collisions and blockades of the drive or the mounting parts.
  These can lead to damages of the internal mechanics.
- Rotating movement of the flange plate and their mounting parts!
  Adjust the speed of the drive as per the developed safety concept, general guidelines and standards or provide safety devices, if required!
- If the maximum torque is exceed, the drive will be switched off.
  After reducing the torque, further movement in push-button mode is possible.
- Exceeding the maximum holding torque or shock loads can lead to damages in the gearbox.
  Loss of self-locking and undesired movement of the workpiece are the consequences.
  When fixing additional mounting parts, counterhold the front block.
- Exceeding the maximum duty cycle can lead to damages of the electric motor. Pay attention to technical characteristics
- In case of damage or malfunction of the components, these must be put out of operation immediately!
- The product was developed, tested and built according to the applicable EMC standards.
  In the beginning of the start up it has to be checked whether there are faults in or interactions between the components used.

Note - qualification of the user

All works may only be effected by qualified personnel familiar with the handling of hydraulic components.

5.3 Personal protective equipment

For works at and with the product, wear protective gloves!

For works at and with the product, wear safety shoes!

6 Application

6.1 Intended use

Rotating modules are designed for universal use in assembly and handling processes in the industry.

They are used for industrial applications in order to rotate workpieces rationally, quickly and safely.

Furthermore the following are possible uses:

- Max. forces and / or torques only with the values indicated below technical characteristics.
- Max. torques at the hand lever only with the values indicated below technical characteristics.
- Use only within closed, low-dust rooms
- Use within the capacity indicated in the technical characteristics (see data sheet).
- Use as per operating instructions.
- Compliance with service intervals.
- Qualified and trained personnel for the corresponding activities.
- Mounting of spare parts only with the same specifications as the original part.

6.2 Misapplication

⚠ WARNING

Injuries, material damages or malfunctions!

The product must never be opened. At the product no changes must be made, except the ones expressly mentioned in the operating instructions!

The use of these products is not admitted:

- For domestic use.
- On pallets or machine tool tables in primary shaping and metal forming machine tools.
- If due to vibrations or other physical / chemical effects damages of the products or seals can be caused.
- On pallets or machine tool tables that are used to change the characteristics of the material (magnetise, radiation, photochemical procedures, etc.).
- In areas for which special guidelines apply, especially installations and machines:
  - For the use on fun fairs and in leisure parks.
  - In food processing or special hygiene regulations.
  - For military purposes.
  - In mines.
  - In explosive and aggressive environments (e.g. ATEX).
  - In medical engineering.
  - In the aerospace industry.
  - For passenger transport.

7 Transport

⚠ WARNING

Injury due to overturning product!

Overturning product due to inappropriate means of transportation.

Do not stand below the load during lifting and lowering, stay outside the danger zone.

Use suitable means of transportation.

Pay attention to the weight of the equipment.

Pay attention that the product is safely located (centre of gravity see instruction sign).

⚠ CAUTION

Damage caused by incorrect transport or means of transport!

Lift the product only at the provided devices.

For works at and with the product, wear protective gloves!

For works at and with the product, wear safety shoes!

The product is delivered on a transport pallet and may only be transported to the place of destination by corresponding conveyors (pay attention to the weight), or be lifted from the pallet (see fig.).

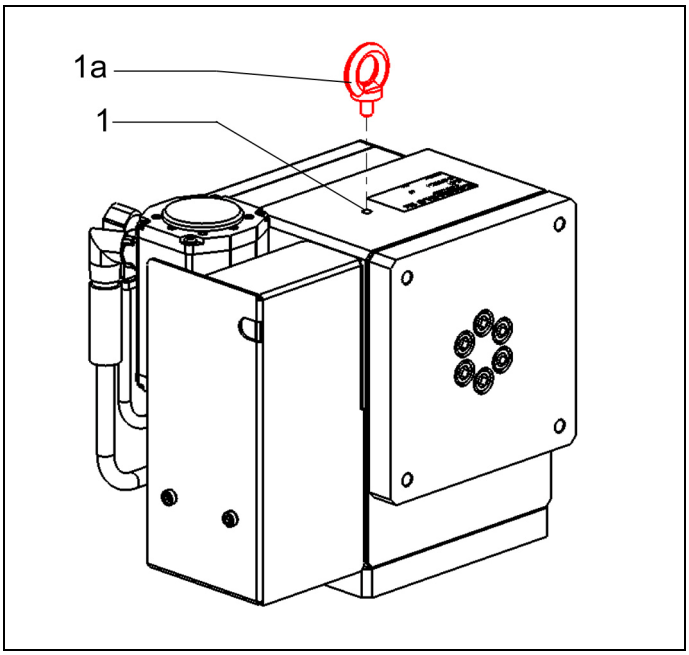

Figure 1: Place for lifting by forklift truck

1 Thread to fix an eye screw	1a Eye screw (not included in the delivery)

For transport and ease of assembly, a thread M8 for eye screws is provided in the housing of the rotating module.

8 Installation

8.1 Design

⚠ WARNING

Injury by falling parts!

Keep hands and other parts of the body out of the working area.

Wear personal protection equipment!

⚠ CAUTION

Damage of components!

Some product types have a considerable weight. These have to be secured against working free during transport.

Weight specifications see chapter "Technical characteristics".

⚠ CAUTION

Damage of components!

Side loads and forced conditions on the product lead to the premature failure.

Avoid forced conditions (overdetermination) of the product.

Max. forces and torques see technical characteristics.

⚠ CAUTION

Damage of components!

The maximum operating torque at the operating shaft must not be exceeded.

This can be achieved e.g. by limiting the operating stroke of the customer's operating element (hand lever or pedal) by the floor.

8.2 Version for horizontal load

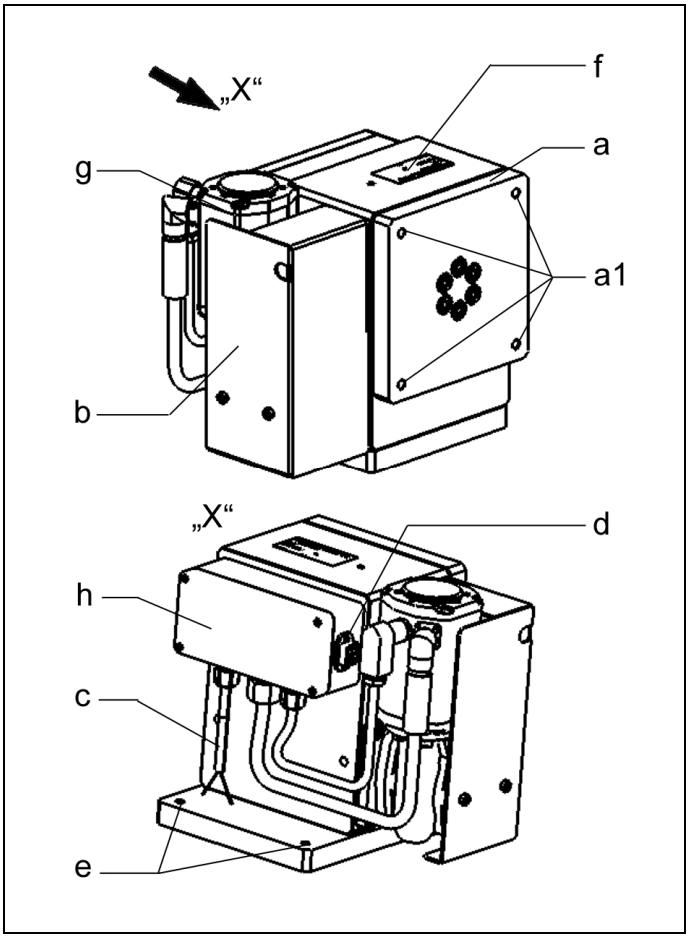

Figure 2: Components, horizontal version

a	Flange plate	c1	Threads 4 x M10 to fix the rotating module
a1	Thread (4 x M10) to fix mounting components of the customer	f	Name plate
b	Protection plate	g	Electric motor with gear-box
c	connecting cable 2 x 1.5 mm^2, length approx. 3 m. 1 = + 24 V 2 = 0 V (GND), numbered	h	Housing with control
		X	View in the direction of the arrow
d	Connector socket for manual switch or foot switch (accessory)		

8.3 Design of the accessory

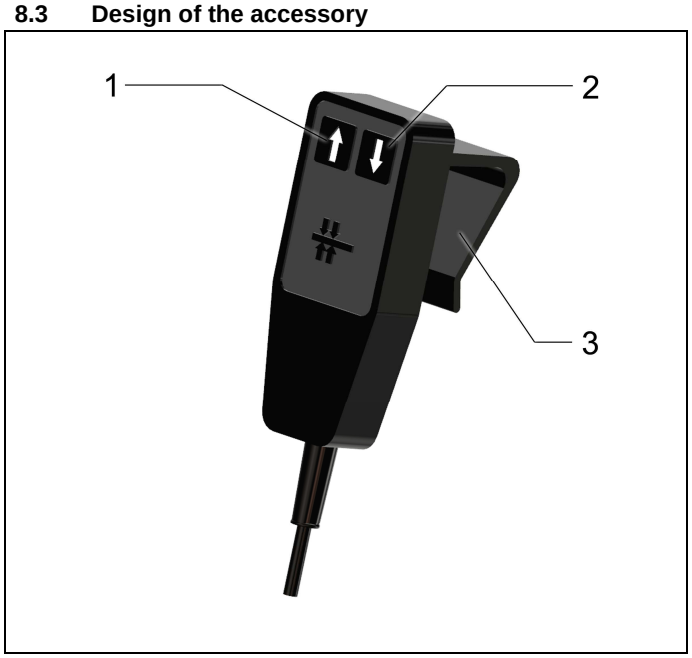

Figure 3: Hand panel

1	Push-button "clockwise rotation"	3	Fastening hook
2	Push-button "counter-clockwise rotation"		

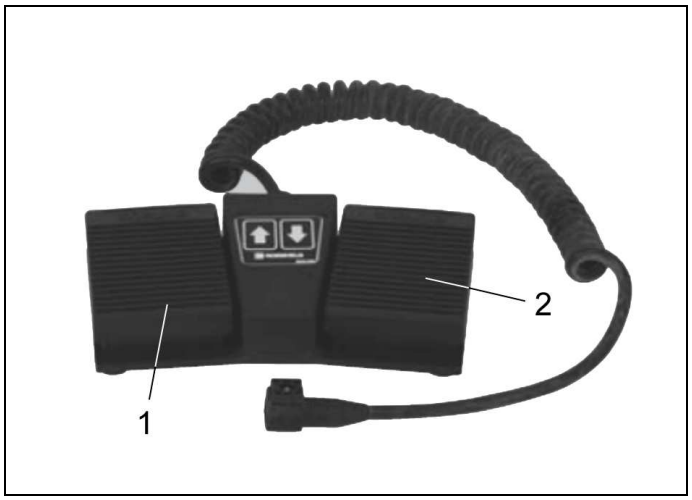

Figure 4: Foot switch

1	Push-button "clockwise rotation"	2	Push-button "counterc-lockwise rotation"

8.4 Fixing of the product

⚠ WARNING

Injury due to overturning product!

Overturning product due to missing or incorrect fixing!

Fasten bottom plate on the floor.

When introducing torques within the load limit (see technical characteristics) we recommend to use an additional base plate (accessory) and to secure this plate correctly.

⚠ CAUTION

Damage of components!

When mounting workpieces to the flange plate, make sure that the shaft of the screw does not protrude.

Otherwise the flange plate can be blocked.

⚠ CAUTION

Damage of internal components!

Shock loads onto the output axis can lead to damages.

When mounting the connecting construction, the flange plate must be secured externally.

Note

The position and mounting type depend on the design of the rotating module.

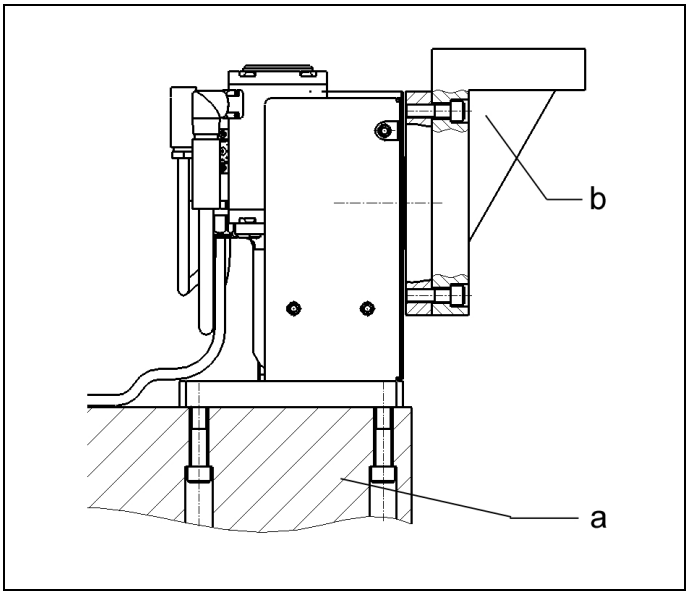

Figure 5: Possible types of mounting

a Customer's fixture body	b Angle bracket provided by the customer at the flange plate

8.5 Mounting of the customer's connecting construction

⚠ CAUTION

Damage of components!

When mounting workpieces to the flange plate, make sure that the shaft of the screw does not protrude.

Otherwise the flange plate can be blocked.

⚠ CAUTION

Damage of internal components!

Shock loads onto the output axis can lead to damages.

When mounting the connecting construction, the flange plate must be secured externally.

1. For mounting the customer's connecting construction, bore holes or threads (M10 or ∅10.5 mm) are provided in the top / flange plate.
   All provided bore holes have to be used!
2. Fasten the connecting construction at the top / flange plate.

Note

Dangers due to the connecting construction of the customer, as e.g. squeezing points have to be excluded by the customer's design.

In the case of eccentric loads, it is recommended to compensate these by counterweights. This prevents unregulated swinging of the load (changing - swivelling).

In off-position the indicated maximum torques may occur (see Technical characteristics).

The required forces and torques, around the axis of rotation, have to be considered by the operator.

9 Start up

⚠ WARNING

Injury by crushing!

Components of the product make a movement while they are in operation.

This can cause injuries.

Keep parts of the body and items out of the working area!

⚠ WARNING

Injury by crushing!

Due to protruding components there can be pinch points during installation.

Keep hands and fingers away from pinch points!

⚠ WARNING

Injury / burning due to contact with energized parts!

Before working on electric equipment, the energized parts must be de-energized and secured.

Do not open protection covers at electric parts.

All electrical works must only be realised by electricians.

9.1 Preparation for start up

Before start up the following tests have to be made:

- Check if there are any transport damages at the rotating module
- Check tight seating of the plug.
- The cables must be fixed by the user so that no bending and tensile stress will act and the cables cannot be damaged in any way.
- The rotating module was developed and built according to the applicable EMC standards EN 61000-6-2 and EN 61000-6-4.

  It has to be checked whether there are faults in or interactions between the components used.

9.2 Connection of power supply

The power supply is made via an external switching power supply (see accessory).

Alternatively a 24 VDC switching power supply, 20 A, can be used that must be designed with short circuit protection.

- Connect the connecting cable to the power supply.

  Connection:

  1 = + 24 V

  2 = 0 V (GND),

  numbered

9.3 Connect manual switch or foot switch

- Connect the manual switch or foot switch to the bushing of the rotating module and fix it with the enclosed screw. Tightening torque max. 0.4 Nm.

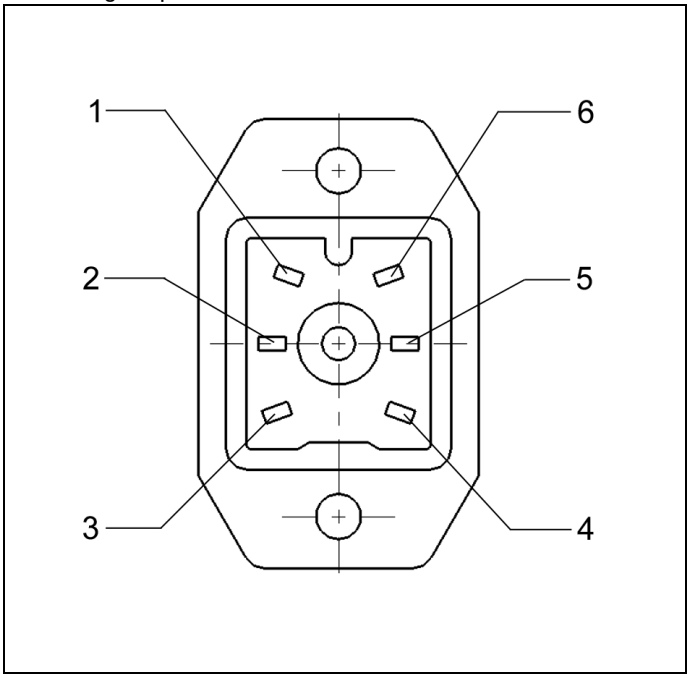

Figure 6: Connection of the ports

1	+24V output (for manual switch)	4	input at the left side
2	GND	5	output position reached +24V
3	input at the right side	6	error

9.4 Switch on power supply

To set up the rotating drive and the control, switch on the power supply.

9.5 Move to the off-position - zero position

Push a directional key (↑) or. (↓) of the manual switch or foot switch (see accessory). Turn the flange plate (with mounted parts) to the desired off-position - zero position.

9.6 Save the off-position - zero position

To save the off-position, push both directional keys of the manual switch or foot switch for three seconds. The current position will be saved as off-position - zero position.

9.7 Interface for higher-level control

Reaching of the position "position reached **(5)**" can be evaluated by the higher-level control.

9.8 Adjustment of the speed of rotation

⚠ WARNING

Injuries due to rotating movement of the flange plate and their mounting parts!

Adjust the speed as per the developed safety concept, general guidelines and standards or provide safety devices, if required!

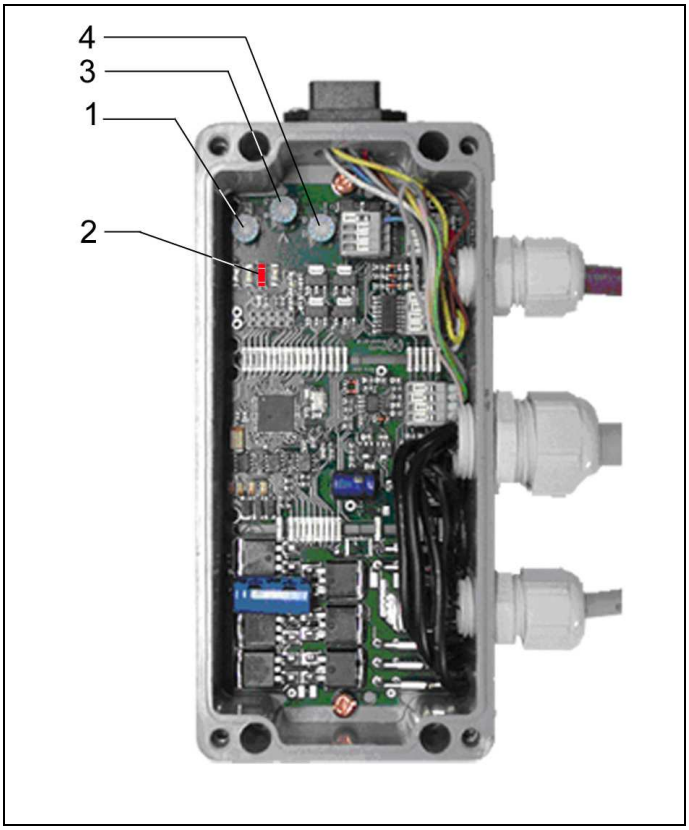

Figure 7: Position of the elements on the board

1	Trimming potentiometer to adjust the indexing angle	3	Trimming potentiometer to adjust the speed of rotation
2	LED for the display of malfunctions	4	Trimming potentiometer to adjust the braking curve

The speed of rotation can be adjusted by a trimming potentiometer on the control board.

For this purpose, open the cover of the control.

Carefully operate the trimming potentiometer with the screwdriver until the desired speed of rotation is obtained.

Close the cover again.

9.9 Adjust the indexing angle

The indexing angle is factory set to an angle of 90°. This means that the rotating module stops automatically when reaching one of the 90° positions.

However, this can be adapted afterwards to the desired requirements.

The indexing angle can be changed step by step by means of the trimming potentiometer with the marking E on the control board.

- Pos. 0 - indexing angle 90° (factory setting)
- Pos. 3 - indexing angle 45°
- Pos. 7 - indexing angle 60°
- Pos. 10 - indexing angle 180°

Screw on the cover.

10 Operation

⚠ WARNING

Injury by crushing!

Components of the product make a movement while they are in operation.

This can cause injuries.

Keep parts of the body and items out of the working area!

⚠ WARNING

Injury by crushing!

Due to protruding components there can be pinch points during installation.

Keep hands and fingers away from pinch points!

The control works in the so-called touch control mode.

When tapping a direction key, the drive rotates by 90° and then stops automatically. If the key is released during the movement, the drive stops immediately.

11 Maintenance

11.1 Cleaning

The following cleaning works have to be effected daily at the mechanical components.

1. Clean with cleaning clothes or cleaning rags.
2. Slightly lubricate the metallic components (plates, guides, etc.).

11.2 Monthly checks

- Visual inspection.
- Check the unit for damages and possible running marks, repair if required.
- Check the axial and radial clearance, repair if required.
- Check all fixing screws, retighten if required.

11.3 Yearly checks

The power supply must be checked regularly by a specialist, but at least once a year for proper function.

11.4 Repair

Note

Repair works, as e.g. the change of the interior lifting jack may only be effected by the ROEMHELD service technicians.

11.5 Service life

In the case of high availability, the rotating modules should be checked at the latest after 1,000,000 rotating cycles (1/4 rotation) or after 2 years by ROEMHELD service personnel.

12 Trouble shooting

⚠ CAUTION

Damage of components!

All works only to be effected by ROEMHELD service staff.

12.1 Error detection / error code

External influences or internal faults can lead to faulty functions of the module.

The control carries out a number of checks and displays faults by an error code as a flashing LED on the integrated control board.

This can be detected visually, but can also by evaluated through the interface signal "Message error code" by a priority control.

The error code consists of a series of flash impulses followed by a pause.

By counting the flash impulses between the pauses the error code can be determined.

The currently evaluated errors are listed in the following table.

Error code	Cause
2	Reset of the processor during motion command
3	Undervoltage of the supply of the control
4	Overvoltage of the supply of the control
8	Inadmissible switching modes of the commutation transistors
9	Relative duty cycle exceeded
10	High overcurrent by defect component (cross fault)

12.2 Trouble shooting

Trouble	Cause	Remedy
Indexing angle (90°) is exceeded	Incorrectly set starting position - zero position	Reset the starting position - zero position
	Too fast rotation	Reduce speed of rotation
	Max. admissible torques exceeded	Reduce torques
	Indexing defect	⚠ **Caution !** Works only to be effected by ROEMHELD service personnel.
The product stops or does not start running, also with pressed button.	Energy supply is interrupted	Re-establish energy supply
	Max. admissible torques exceeded	Reduce torques
	External blockade of the workpiece or the fixture	Remove blockade
Clearance in the indexing too large	Wear or max. admissible torques exceeded	⚠ **Caution !** Works only to be effected by ROEMHELD service personnel.

13 Technical characteristics

Maximum admissible load

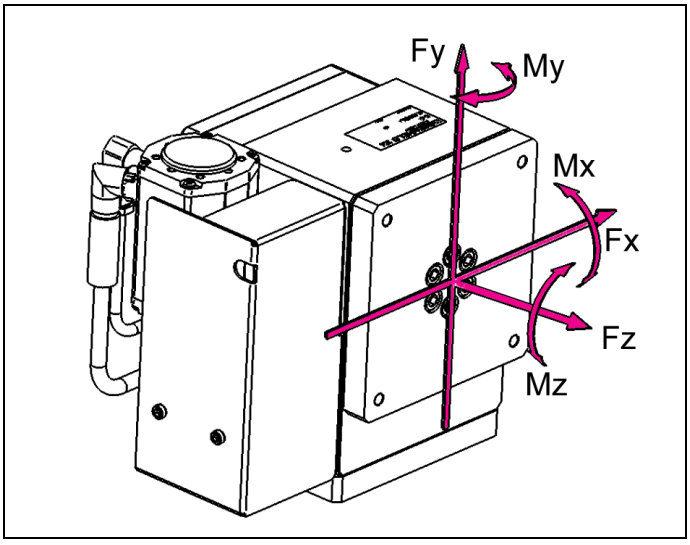

Figure 8: Axes of the introduced forces and torques, horizontal

General characteristics

	65050236E
Max. admissible force	
Fx, [N]	2,000
Fy, [N]	2,000
Fz, [N]	1,000
Max. torque Mz, driven, [Nm]	120
Max. holding torque MZ, static, jerkyless [Nm]	500
Max. admissible torque, total Mxyz, [Nm]	800
Angle of rotation	360°
Indexing angle, preadjusted	4 x 90°

Max. speed of rotation, [1/min]		7.5
From the starting and extending speed results a cycle time of 3 sec.		
Max. duty cycle:		25%, 1 min On
Code class		IP54
Current consumption at max. torque, A		20
Supply voltage, V DC		24…30
Weight		23 kg
Surfaces:	Gear housing and motor	black anodized,
	Flange plate and protection plate	black oxide
	Control box	grey
	Gearbox	zinc die-cast, bright

In the case of eccentric loads, it is recommended to compensate these by counterweights. In off-position the indicated maximum torques may occur.

Current consumption

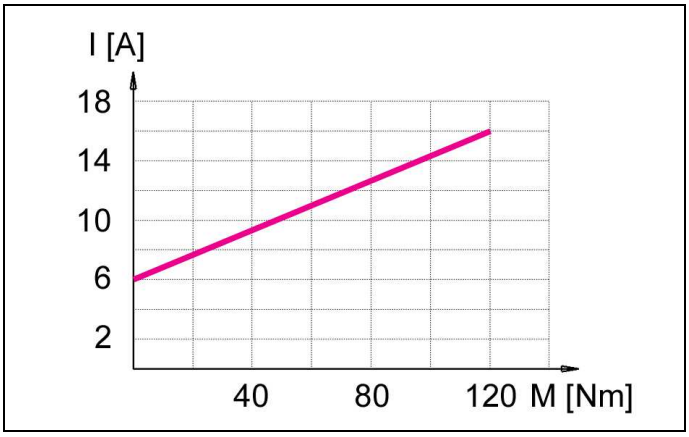

Figure 9: Diagram of the current consumption

M Torque [Nm]	I Current consumption [A]

Tolerance of performance data ±20 % at room temperature of 20°C and run-in mode!

Performance data are determined arithmetically and are valid under reserve of practical tests!

Note
For further technical data see data sheet.

13.1 Accessory

Hand panel with connecting cable 1.6 m	3823 025
Foot switch with connecting cable 1.5 m	3823 029
External switching power supply	3822 322

Note
See data sheet.

14 Disposal

Hazardous to the environment
Due to possible environmental pollution, the individual components must be disposed only by an authorised expert company.

The individual materials have to be disposed as per the existing regulations and directives as well as the environmental conditions.

Special attention has to be drawn to the disposal of components with residual portions of hydraulic fluids. The instructions for the disposal at the material safety data sheet have to be considered.

For the disposal of electrical and electronic components (e.g. stroke measuring systems, proximity switches, etc.) country-specific legal regulations and specifications have to be kept.

15 EC-Declaration of conformity

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15.1 Validity of the documentation

This document applies to the following products:

Rotating modules - horizontal axis of data sheet . The following types or part numbers are concerned:

- 6505 0236 E

The listed products are designed and manufactured in line with the relevant versions of the EC directives **2006/95/EC - Low voltage directive** and in compliance with the valid technical rules and standards.

In accordance with **2006/42/EC** (EC MSRL) and E 982 these products are components that are not ready for use and are exclusively designed for the installation into an incomplete machine / machine.

The products may only be put into operation after it was assessed that the incomplete machine / machine, in which the product shall be installed, corresponds to the machinery directives (2006/42/EC).

The manufacturer commits to transmit the special documents of the products to state authorities on request.

The technical documentation as per appendix IV was prepared for the products.

Responsible person for the documentation:
Dipl.-Ing. (FH) Jürgen Niesner, Tel.: +49(0)6405 89-0.

Römheld GmbH
Friedrichshütte
Laubach, 20.12.2012

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